Notes from Today's Meeting: 2/20/20 – 11:00-noon

Attendees: Aaron Larsen, Pete Wax, Joe Nett, Kris Jensen, Janice Alers, Paul, Mark, Tina Laidlaw, Mike, Mark Hernandez

NSTEPS North Dakota Lakes Data Compilation and Analysis Planning – Discussion Questions

The following questions are meant to help guide today's discussion of the data summary and planning the next task – data analysis.

Data Summary Report

1. Are we missing data?

    a. Phytoplankton? Phytoplankton data for NLA 2017 needed

    b. Zooplankton (we noticed reference to the NLA zooplankton MMI in the 2019 IR)? NLA data – in Lakes files in 2017

    c. Toxins (again, we noticed reference to HABS surveillance program in 2019 IR)? Have not yet provided this data – currently just hit and miss grab samples. 2017 NLA – microcystin

2. Tina: Mike, can get the above data from Lester? Scant data. Pete: should be enough samples with the intensification data for all three of the indicators. Mike – enough data to develop relationships, but is ND interested in this?

    Joe: Data not available yet for 2017 NLA. 2012 data – phytoplankton, only cyanobacterial counts. All that was analyzed in 2012. Intensification data more detailed.

    Tina: Interested in looking at these 3 as potential indicators? AL: Yes. Mike: Okay, we will pursue

    a. Army Corps data (e.g., Lake S)? How accessible is this data? Is any of this data available in-house? AL: Will dig and see what is available for some of the Corps data.

    b. Other programs?

    c. Why is the chlorophyll a/Secchi data so thin (looks like only NLA sampling)? Those chlorophyll levels are impressive too 2012 and 2017 only? JN: Didn't get the data to you. ND collects it for every site. PW: Data to the mid-90's. Not in the all-lake nutrient data pull. JN: Secchi data in a separate file. Also did not see chlorophyll data. Mike: will send an email — will send the data back so the secchi/chlor. a can be added.

3. What are the units on the NLA data? We presumed, but need to confirm. They were not in the dataset sent. Will send presumed units for the NLA data and ask the state to confirm in the email will send.

4. Do you agree with the spatial conclusions?

    a. SW ND is sparse. AL: Distribution overall looks good, but do believe there is some data missing. Think we can enhance this dataset a bit.

b. No detection limits – can send this for chlor. and nutrients data. Should have 2012 NLA data as well. Mike: for Nutrient data, ND did provide a ND data field, i.e., half the detection limit.

c. Mark: Figure 1 question – are there enough dots on the distribution map? May get to this.

5. Do you agree with the temporal conclusions?

a. Little winter data (but fish kills/winter DO were noted as issues in the 2019 IR) – are we missing winter data? 2013, only winter data on Devil's Lake. ND not allowed to go out on the ice anymore.

b. We can go back >10 y (e.g., Assessment guidelines say 10y or less but this is not assessment), how to proceed? Mark: We can go back farther than 10 years. How far is it "safe" to go? What temporal frame is okay to use year-wise. TL: Option to just use all of the available data. AL: ND okay going back as far as needed. No known lab issues from mid to late 90's.

c. Any data/lab issues we need to know about over time (e.g., change in MDLs, RLs)? AL: NO

Data Aggregation --- Analysis

1. How should we aggregate the data? Can use individual grab samples, vs. averaging everything by station over time. Comparing fig. 4 & 5 or 7 & 8. Can look at long-term averages. Typically like to look at grab data and annual average data. Annualized average tends to remove the extra weight of having highly sampled lakes in the dataset. JN: Like the idea of having an annual average for each lake. Don't like the idea of the long-term average from a statistical standpoint. Mike: Like to use the annual averages. Removes some of the noise, but also like to compare it with the grab sample data.

a. Grabs – most data, most noise vs. Long-term – least data, least noise or in-between?

i. Assessment guidelines say at least 2 samples in growing season (year independent) – but that is assessment. Average all the data or just the growing season average?

b. Seasonal vs Annual (April – November) is in guidance. AL: Think this makes the most sense. Some older data may include some winter samples.

c. Station vs Lake Averages? How does the state assess? JN: Not many lakes with multiple stations. With regard to nutrients, in-lake differences are not that great. Lake averages okay. PW: With the caveat for Lake Sakakawea and Devil's Lake? DL has a west to east nutrient/sulfate gradient.

Lake S: treat it as 3 lakes? Treat these two lakes slightly different for lake classif. TL: Do we want to even consider Lake S due to s.s. criteria? Mike: Would be nice to have that data, but it can be kept separate. JN: Agree with Tina, maybe exclude it. Mike: Okay.

d. Should we make analysis match assessment frames?

i. Seasonal samples (Apr-Nov), 2 sample averages or seasonal averages

2. How does ND enforce DO? Mike: Have DO data, will probably end up getting some more.

a. "Daily min of 5 mg/L does not apply to hypolimnion of class III and IV stratified lakes" ID a chlor target using the relationship between chlor and DO. ND does not look at DO concentrations in the hypolimnion. Avoid? Or assess? For lakes deep enough to stratify.

b. So what should we use? Non-hypol. water column average? Minimum? Okay to stay above the hypolim. – PW, but ND does have profile data below the hypolimnion. JN: Yes, okay to stay above. Mike: Get some good relationships between chlor and hypolimnetic DO. Can be useful to be able to say we want to avoid hypoxia in cold lakes --- for modeling. Can be hard to figure out

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what the targets should be. Squeeze zone. Need a meter-deep lens in the thermocline to meet fish oxygen needs. Can look at DO concentrations in the thermocline zone.

c. Other classes? TL: Look at both DO and chlor if ND is interested in these analyses. AL: Sounds good.

d. Should we also model a hypolimnetic value? Which one? Daily limit of 5. How is this interpreted? Read it as don't want below 5mg/l. How reported on 303(d) is called impaired. PW would have better answer for how this limit should be interpreted.

3. What about frequencies?

a. Are the DO and chlorophyll guideline values NTE or 10%, is there a 1 in 3 allowance? ND: Is a 10% caveat.

Analysis Approaches

1. Classifications – which should we pursue?

   a. Ecoregions

   b. Depth/Area

   c. Cold/Cool/Warm water lakes?

   d. Others?

2. Distributional analysis

3. Stressor-Response

   a. Targets (mostly about identifying a Chlorophyll target, since Chl~Nutrient models are fairly precise)

      i. ALU assessment method says hypereutrophic lakes do not support uses – so can we use TSI of 60 and the Chl (20 ug/L), SD (1m), and TP (50 ug/l) values for that as targets?

      ii. Apr-Nov 20 ug/L seasonal chlorophyll a average – is that an average or grab? What is allowable frequency of exceedance?

      iii. What about using Chl targets from NLA models, once and if they come out?

      iv. Can we derive Chl targets from DO – if so, which DO value to target? (non-hypolimnetic minimum of 5 mg/L, hypolimnetic target?)

      v. What about phytoplankton response data? Cyano densities?

      vi. Is there any user perception target? (Narratives include "unsightly", "objectionable growth" – and MN has user perception based targets, are they transferable to even western ND?)

      vii. Are there toxin targets? Narratives have "toxic to humans" language. So what about advisory levels or recreational toxin values?